

Application of GRACE for Monitoring Groundwater in Data Scarce Regions

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In the United States, groundwater storage is somewhat well monitored (spatial and temporal data gaps notwithstanding) and abundant data are freely and easily accessible. Outside of the U.S., groundwater often is not monitored systematically and where it is the data are rarely centralized and made available. Since 2002 the Gravity Recovery and Climate Experiment (GRACE) satellite mission has delivered gravity field observations which have been used to infer variations in total terrestrial water storage, including groundwater, at regional to continental scales. Challenges to using GRACE for groundwater monitoring include its relatively coarse spatial and temporal resolutions, its inability to differentiate groundwater from other types of water on and under the land surface, and typical 2-3 month data latency. Data assimilation can be used to overcome these challenges, but uncertainty in the results remains and is difficult to quantify without independent observations. Nevertheless, the results are preferable to the alternative – no data at all – and GRACE has already revealed groundwater variability and trends in regions where only anecdotal evidence existed previously.